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# Green Growth in Jordan: Leveraging Waste Management for Sustainability, Poverty Reduction, and Social Development

**Olga Shalamai**
Department of International Economic Relations, Business and Management, Ukrainian American Concordia University, 01054, 8-14 Oleksandr Konysko Str., Kyiv, Ukraine.
Email: olga_shalamai@edu.cn.ua | ORCID: https://orcid.org/0000-0002-1100-4643

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## Abstract

This paper examines Jordan's social development in the context of ecology and waste recycling through an analysis of the Hashemite Kingdom of Jordan's 2021-2025 National Green Growth Plan, which prioritizes green growth. The study addresses Jordan's environmental challenges, including high waste generation, limited recycling infrastructure, and the socio-economic impacts of the Syrian refugee crisis, emphasizing the need for strategic waste management to achieve national development goals. The methodology employed involved a comprehensive review of recent literature, a detailed analysis of waste generation and recycling data, and an evaluation of green growth strategies outlined in Jordan's national plans. To enrich the study, global best practices and case studies were incorporated to propose actionable solutions. The findings of the study highlight several barriers, including inadequate infrastructure, limited public awareness, and poor private sector involvement. The study identifies waste collection and recycling as potential avenues for poverty reduction, economic innovation, and reducing reliance on imported materials. The study recommends the implementation of Extended Producer Responsibility (EPR) initiatives, the enhancement of public awareness, and the leveraging of technologies such as the Internet of Things (IoT) for the efficient management of waste. The promotion of private sector partnerships and the engagement of vulnerable communities can drive sustainable growth, positioning Jordan for a greener economy.

## Keywords

Green growth; Wastewater management; Poverty reduction; Sustainability; Resource efficiency

## Introduction

One of the most pressing threats facing humanity and modern civilization is the environmental catastrophe, which has various facets, such as soil and water pollution from industrial waste and human waste, drinking water shortages, and global climate change.

Addressing such disasters is critical for environmental and societal sustainability. While international organizations play a crucial role in promoting environmental conservation and sustainable development, the primary responsibility lies with national governments. Although various international organizations help protect nature and the sustainable development of society, the primary responsibility lies with the national government. Governments are at the forefront of efforts to achieve harmonious development, and poverty reduction and the introduction of waste recycling systems is played by the governments of national states, which can also be seen in the example of the activities of the Jordanian government (Danthurebandara *et al*., 2012). Globally, one-third of all solid waste generated still ends up in open landfills, and only one fifth is recycled (Aldayyat *et al*., 2019). This underscores the untapped potential of waste as a resource that could transform from an environmental burden into an economic asset. Improving the waste management system is recognized today as the main problem in the field of environmental protection. Key steps to address this issue were identified at the International Conference on Sustainable Development in Johannesburg in September 2002. These include waste prevention and minimization, maximum reuse, recycling of resources, use of alternative environmentally friendly materials, involving governments and all stakeholders, to minimize adverse environmental impacts and increase the efficiency of resource use (Lozano, 2024).

A green growth framework and sector-specific activities are included in the Waste Sector Green Growth Action National Action Plan 2021–2025 (GG-NAP), which is in line with the National Green Growth Plan (NGGP), Jordan Vision 2025, and Nationally Determined Contributions (NDCs) under the Paris Agreement (Alam and Ahmade, 2013). Leveraging the sector's resilience through ecologically and socially inclusive economic growth is the cornerstone of the green growth concept. A total of 91% of Jordanians were urban dwellers in 2018, a historically high percentage of urbanization that reflects both the special demands on services brought on by the Syrian refugee crisis and the "typical" difficulties associated with rapid and unplanned growth (MacArthur, Waughray and Stuchtey, 2016). According to Statista (2018), Jordanians generate 0.81 kg of municipal waste per person per day on average, which is 26% more than their counterparts in other upper-middle-income nations (GIZ, 2014). A major focus of the green growth plan in Jordan is the garbage problem, which offers both socioeconomic and environmental opportunities. Regarding the makeup of Jordan's municipal solid trash, food waste accounts for more than half of the waste produced by Jordanian homes (Statista, 2015) In addition, the 7% recycling rate for municipal garbage is poor, even when contrasted with the 10% average for all states in the Gulf Cooperation Council (GCC). Inadequate treatment and disposal facilities, coupled with tax enforcement measures, result in the significant or increasing generation of several forms of waste in Jordan, including hazardous, medical, electronic, construction, and demolition trash, among others. With 10% of GHG emissions coming from landfilled garbage, landfilled waste has a significant environmental impact on Jordan. (Government of the Hashemite Kingdom of Jordan, 2015), a number that is anticipated to rise in tandem with population growth. The waste management industry serves as an example of the opportunities and challenges associated with moving toward a more circular economy and, eventually, a more efficient and safe form of urbanization, which are the primary objectives of the Kingdom of Jordan's green growth plan. For example, investments in the separation of waste at the stage of its collection and campaigns to change the behavior of the

population, as well as promoting recycling and resource reuse habits foster opportunities for the growth of small and medium-sized enterprises (Zighan *et al*., 2024). Technological innovation, creating incentives for investment and increasing the efficiency of the use of resources in the processes of consumption and production can reduce the burden on the state budget, while supporting both economic growth and a high level of ecology, which allows nature to facilitate ecological recovery and supports long-term public health.

In light of the above knowledge and research gaps, this study addresses environmental and socio-economic challenges in Jordan, particularly in the area of waste recycling. The country's waste disposal methods remain underdeveloped, which exacerbates environmental degradation and hinders sustainable development. Additionally, the limited collaboration between government bodies and private sector entities in waste management highlights a critical gap in achieving efficient and sustainable recycling practices. The main objectives of the study are defined:

1. Identification of the main goal and ways of green development in Jordan.
2. Description of the main threats of plastic to flora and fauna.
3. Identification of the main threats to Jordan's economic growth.
4. Analysis of ways to reduce poverty and the role of women in this process.
5. Determination of the factors of interaction between state and private initiatives in the field of waste management in the context of poverty reduction.
6. Description of the basics of responsible production through the efficient use of resources.
7. Providing recommendations to the Jordanian government for more efficient waste collection and recycling.

## Literature Review

Several articles have been addressed to this subject over the last ten years. Pervez and Ahmade (2013) in their article revealed that the unregulated disposal of waste and pollution from various sources creates significant obstacles to nature conservation, which as a result, worsens the overall condition of the ecosystem, negatively affects the health of the population and interferes with the stable development of the economy and society. The findings of the current study align closely with the results presented in the referenced article, confirming its conclusions, therefore, one of its main issues was the implementation and improvement of the waste disposal management process. MacArthur, Waughray and Stuchtey (2016) found that more than 95% of plastic packaging that enters production and sale ends up as waste, and 32% of that waste in the future, does not enter the municipal waste management system. This problem is especially relevant for Jordan, as the existing waste collection practices in Jordan reflect significant room for improvement.

Beaumont *et al.* (2019) in their article have researched how ingested plastic may affect marine life and they come up with a conclusion that the chemicals contained in plastic can cause generational and population-level impacts on marine life, which travel up the food chain. Since Jordan has two seas, the Red and the Dead, the study of the impact of plastic particles on the pollution of water bodies and the state of marine flora and fauna is relevant for this state, besides, the Red Sea is now an ecological disaster due to the

war with the Yemeni Houthis. GGNAP in their report, Waste Sector (2020), analyzed the role of Jordanian municipalities and the required expenses. This role will be further explored in the current research paper. Danthurebandara *et al.* (2012) described the cost drivers for emissions of harmful greenhouse gases GHGs. It turned out that it is cheaper and safer to introduce systems of control and management of landfills than to overcome the consequences of soil and water pollution with heavy metals and dangerous chemical compounds.

Wilson, Velis and Cheeseman (2006) proposed a solution for waste management – integrating the informal sector into the waste management planning process, building on his practice and experience while working to increase efficiency and improve the living and working conditions of those involved in this process. All this correlates with the fact that many people living in cities depend on waste recycling processes in the context of making a profit from it. Assayed *et al.* (2023) suggest using the concept and tools of the Internet of Things to collect data related to resource-efficient and cleaner production at the industry level, which can help to accurately control the carbon footprint that appears in the production process. Monitoring of emission data is usually carried out with the help of sensors that can estimate the number of harmful substances in the air or on the ground, based on which the level of pollution is then analyzed and measures are developed to neutralize the danger. Zighan *et al*. (2024) focused on the role of international food retailers in Jordan in implementing 4 specific dimensions of sustainable supply chains (responsible packaging, reduction, redistribution and recycling) and the impact of this implementation on food security in Jordan. All of these aspects of supply chains reduce the negative impact on the environment, as responsible packaging requires the retailer to use the most environmentally friendly packaging possible, and recycling will reduce the volume of landfills required and provide Jordan with cheap and clean energy.

Al-Bawwat *et al*. (2023) in their scientific paper considered two options for using residues, namely thermal treatment and their conversion into biogas. Based on this, they evaluated the inclusion of biomass processing in the Jordanian energy network. Jordan's need for cheap and clean energy is critical, as the population of this country feels a lack of it. Therefore, this research is extremely important, as it shows new ways of obtaining electricity, which, in addition, will allow to disposal of a significant part of waste. The article by Abu-Qdais, Shatnawi and Al-Shahrabi (2023) contains a set of recommendations for more municipalities in Jordan, the main of which is the need to create an effective mechanism for collecting solid waste for further processing, rather than using the practice of increasing electricity bills. The effect of the recommendations given in this scientific article is difficult to overestimate since the constant increase in electricity tariffs only increases poverty, which, in turn, prevents the building of a developed society that lives in harmony and provokes discontent among the poorest sections of Jordanian society. Aldayyat *et al.* (2019) determined that one of the main negative factors of insufficient waste recycling is the lack of awareness of refugees from Syria about waste management. Their research allowed us to capture another component of insufficient waste recycling, namely the lack of effective information for refugees. Hajar *et al.* (2020) assessed the sustainability of the solid waste management sector in Jordan using the Sustainability Window tool. This allowed us to identify examples of the use of modern technologies for the specifics of solid waste management in Jordan.

Thorne (2021) examined a skills development program in northern Jordan that significantly contributed to the well-being and personal development of the women involved. This scientific work allowed us to identify the importance of involving women in economic processes in Jordan. Al-Sharif, Geldermans and Rinke (2024) investigated the practicality of concrete recycling in the context of construction waste management in a cyclical economy in Jordan. This study allowed us to determine the relevance of construction waste recycling in Jordan.

## Methodology

It is necessary to present the methodology for selecting literature on the chosen topic for analysis. The main criterion for selecting literature was its relevance (not older than twenty years) and diversity (works by different groups of researchers). The search was carried out using the search engines Google and Google Scholar (a specialized system for searching for scientific publications). Among the search keywords and phrases, the following were used: “waste”, “pollution”, “chemicals”, “ecological disaster”, “greenhouse gases”, “waste management”, “carbon footprint”, “food supply”, “use of residues”, “refugees”, and “women's development”. After forming the methodology for literature selection, it was decided to proceed to the analysis of the selected literature. In the course of this analysis, it will be shown what it gave for writing the current article.

In the course of the research, thematic literature, monographs, scientific-analytical publications of foreign scientists on the studied issues, and the results of independent observations were used. The selection criteria for all sources are the same as those used for the literature analysis in the previous section. All research methods were selected by the created algorithm, which first collects information; identifies the central key concepts; identifies the stages and factors of the object's development; performs calculations and draws intermediate and general conclusions. For ethical reasons, interviews with Jordanian residents and refugees were not used among the methods used to collect information. All information was obtained by analyzing existing literature. A number of the following general scientific methods were used following Pyvovarov and Chepur (2020) to solve the research tasks:

1. Monitoring technique: used to gather, organize, and evaluate data on resource efficiency, social development, poverty alleviation, and environmental sustainability;
2. Method of abstraction: used in the course of the study to highlight the main concepts and categories;
3. Methods of analysis and synthesis: used in the process of identifying the stages and factors of development, as well as the most influential elements of the researched object;
4. Abstract-logical and dialectical methods of scientific knowledge, as well as the method of scientific abstraction, were used in the research to form theoretical generalizations, clarify the conceptual apparatus, and formulate conclusions;
5. Method of quantitative data processing: allowed to express in numerical values different aspects of the investigated issues.

Such groups of special methods were used to solve individual research tasks, such as information collection methods; information processing methods; methods of analytical work; and justification methods.

## Results

### *Enhancing natural capital for green development in Jordan*

The first goal of Jordan's green development is to increase the country's natural capital, which the government of this country can help with various solutions. This strategy is aimed at permanently improving the quality of natural resources used for economic growth through their processing and production and providing ecosystem services that support the activities of Jordan's economic sectors.

Natural capital is defined as the "stock of natural assets, including geology, soil, air, water, and all living things" (NSW Environment and Heritage, 2024). These natural capitals are typically used to drive economic growth in the countries that own them by stimulating business through their use in production and supporting livelihoods. They are also used to manage ecosystem services, such as providing people with clean water and good quality soil and air, which undoubtedly have high economic value.

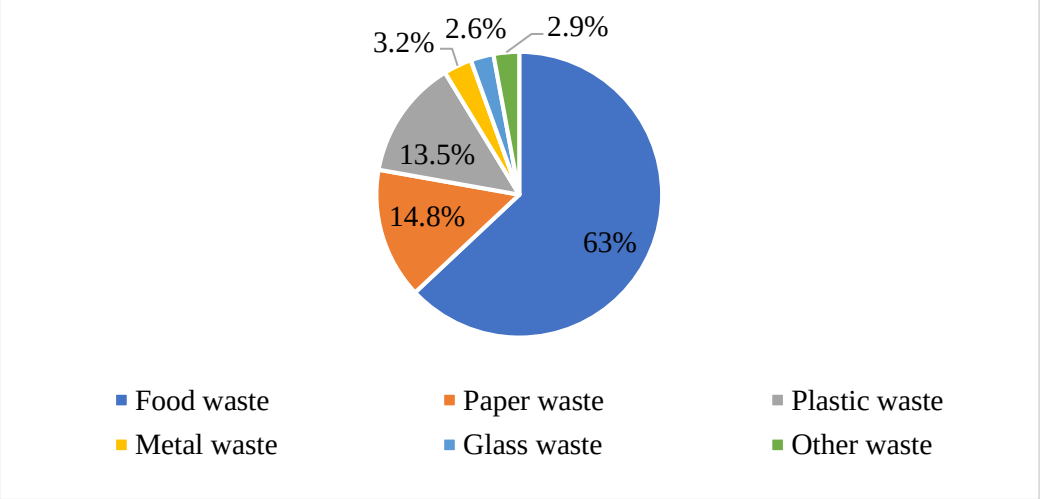


Figure 1: Percentage distribution of waste generated in the capital of Jordan by its origin (Awad, 2024)

Uncontrolled dumping of waste or pollution from industrial, commercial, agricultural and residential sources creates significant obstacles to the conservation of natural capital. Improper handling of household and production waste can lead to the leakage of toxic, corrosive, reactive or other dangerous substances into the soil and water bodies, which will make them unsuitable for further use (Alam and Ahmade, 2013). Untreated hazardous materials, such as industrial or medical waste, can lead to the release of heavy metals (such as zinc or lead) and toxic chemicals into the air, soil, surface or groundwater, affecting the health of newborns and causing numerous plant diseases and fauna. After all, pollution worsens the health of the ecosystem as a whole, negatively

affects the health of the entire country's population and their livelihoods, and also prevents the economy from developing stably. The country's ecological system is also impacted by the refugee crisis due to pollution, deforestation, soil erosion, and increased water use. Population growth affects the amount of water consumed. When it comes to water resources, Jordan is the fourth-poorest country on earth. The distribution of waste generated in the capital of Jordan by type is shown in figure 1.

Although the percentage of waste generated in the Jordanian capital cannot be extrapolated to all of Jordan, analyzing figure 1, we found the following patterns:

1. Among the waste, food waste prevails, which means a potentially large presence of organic matter in the waste structure. This determines the high prospects for processing waste into biogas.
2. The next type of waste, by the largest share in the total amount, is paper waste. This highlights the potential for waste processing as an income-generating opportunity for marginalized populations, particularly through the collection and recycling of paper waste.
3. Notably, plastic waste represents the third-largest share of total waste. While recyclable, it poses significant dangers to both flora and fauna.
4. The share of metal waste is insignificant, it can also become a way of earning money for the poorest segments of the population, but is also dangerous in terms of soil contamination with heavy metals.

The kingdom is experiencing a greater shortage of water as a result of the refugee crisis, and there is a discernible gap between the amount of water that is needed and what is available. According to Jordan's Ministry of Planning and International Cooperation, 70% of Jordanians and refugees do not have access to enough water per day to meet the national standard of 100 liters per person. This assessment was made in connection with the migratory issue. Due to poverty, population increase, and the country's declining economic standing as a result of the refugee crisis, Jordanians are being compelled to exploit their natural resources, which has resulted in illegal logging to make up for the country's high fuel and oil prices. The problem of solid waste management in Jordan is aggravated by the presence of a large number of Syrian refugees, reaching 600,000 people, 80% of whom have settled in municipal jurisdictions (Aldayyat *et al.*, 2019). It is evident that following a sizable refugee inflow, there has been a rise in environmental infractions (Salameh, 2023). One of the projects to preserve Jordan's natural capital is the project to save the Dead Sea, for the implementation of which the governments of Jordan and Israel signed an agreement to replenish the Dead Sea with water from the Red Sea - a canal will be laid through which 300 m^3 of water will enter the reservoir annually (Statista, 2018).

Waste can have long-term environmental and societal impacts, even in communities located far from disposal sites. Also, it can have long-term effects on the environment and people. 95% of plastic packaging that enters the economy is thought to be thrown away as waste, with 32% of this rubbish evading municipal waste collection (MacArthur, Waughray and Stuchtey, 2016). The annual amount of plastic garbage poured into the world's oceans is approximately 8 million tons when combined with waste from fishing and ocean-based leisure. Marine animals may become entangled in these polymers or suffer other serious harm. Marine life, which consumes marine plastics and associated

chemicals to move up the food chain, can be negatively impacted by ingested plastics and the chemicals they carry at the generational and population levels. It is predicted that the annual cost of the multi-level effects of plastics' deterioration of ecosystems is USD 2.5 trillion (Beaumont *et al*., 2019).

Municipalities are in charge of paying for all waste collection expenses as well as, on occasion, the costs associated with disposal locations, such as small landfills and waste separation facilities. It can divert attention from thinking about the indirect costs by straining already scarce financial resources to pay for these expenses. Solid waste (SW) collection, separation, transportation, storage, and treatment are extensive processes. Depending on the particular situation, the environmental costs of waste management can be challenging to estimate and might differ significantly (European Commission, 2024). Emissions of harmful greenhouse gases (such as methane and carbon dioxide) and pollution from landfill leachate are important cost drivers (Danthurebandara *et al*., 2012). Similar to plastic in the ocean, leachate continuously seeps into soil and water in the absence of effective sanitation procedures. Substances like metals or other chemical compounds linger in the ecosystem, affecting plants as well as the health of animals and humans who come in touch with these dangerous compounds. Leachate pollution cleanup from landfills is a far more time-consuming and costly procedure than sanitary control upgrades for landfills that are already operational.

### *Sustainable economic growth through effective waste management*

The second objective of the national green growth plan of the Kingdom of Jordan is defined as the process of ensuring sustainable economic growth. Effective management of the waste management sector is an important factor in ensuring sustainable economic growth in Jordan. A predictable consequence of economic growth is an increase in the total amount of household and industrial waste, which makes their collection and disposal an increasingly difficult process (Kaza *et al*, 2018). For sustainable management of this situation, improved technical skills, involvement and use of innovations, a high level of social awareness and a change in the behavior of the population are required. However, many developing countries struggle with both the technical and financial burden of waste management, which accounts for as much as 20 to 50% of municipal budgets worldwide (Aleluia and Ferrao, 2017).

To understand the importance of the relationship between sustainable economic growth and waste processing, it is worth remembering that Jordan generates more than 12,000 kilotons of waste and residues every year, of which approximately 42% can be used as a source of biogas, which will overcome Jordan's energy dependence (Al-Bawwat *et al*., 2023). The effectiveness of the waste sector and incentive structures are equally important and for these incentives to be implemented the dialogue between the public and civil society is required.

To achieve sustainability, active engagement of the private sector is essential, leveraging its financial resources, including investments and revenue-generation capabilities, to support and drive sustainable initiatives effectively. The government can shift the obligation of managing post-consumer waste to the producers and generate the required income through the introduction of Extended Producer obligation (EPR) initiatives. The

EPR principle states that producers (developers and manufacturers included) must minimize the environmental effects of their work and account for the expenses of the product's end-of-life (or its packaging) (Ministry of Local Administration, 2014). EPR initiatives work to improve waste avoidance, reduction, reuse, recycling, and recovery to carry out the «polluter pays» principle. Innovation may result from this process, improving the capacity to use garbage as a resource and divert it from landfills (European Commission, 2024).

EPR schemes may help businesses to reevaluate their business models, and future business perspectives, extend the product life cycle, and provide packaging buyback programs. These could be achieved by efficient waste management via R&D plans in the waste sector. Moreover, the government can invest in capacity-building programs and encourage medium-sized enterprises (SMEs) to improve waste recovery systems.

Lack of qualified management of waste disposal systems can lead to negative economic consequences in the long term. It has been proven that there are significant indirect costs associated with poor solid waste management which often leads to fatal externalities such as disease and increased human mortality, water and soil pollution, damage to municipal drainage systems and high greenhouse gas emissions. A further effect of poor solid waste management is a low quality of life for the local population, high recovery costs and low numbers of visitors to the country (for tourism or business), the spread of crime and terrorism (Office of the Federal Chief Sustainability Officer, 2020b). Mechanical biological treatment plants are an alternative to sustainable solid waste management (Hajar *et al.*, 2020). It was found that the average cost of processing solid waste in a modelled plant in Jordan over 30 years would be about US$39 per ton (Thabit, Nassour and Nelles, 2020).

## Discussion

### *Social development, gender equality, and poverty reduction*

Social development and poverty reduction is a third national green growth objective and the main part of Jordan’s long-term development plan. This objective is a predominant element of green growth inclusiveness. To achieve this, the government is focusing on poverty reduction by reducing inequality in society such as women’s empowerment and gender equality, which are the critical part of economic growth. According to a 2015 McKinsey study, women only contribute 37% of the GDP, However, closing this gender gap could significantly boost the global economy, with potential gains estimated between USD 12 and USD 28 trillion (McKinsey Global Institute, 2015). Given that women only contribute 18% of GDP to the Middle East and North Africa (MENA) area, there is a clear potential for economic growth through increased female participation. Unfortunately, women in Jordan, as well as in other countries of the Global South, often do not have the opportunity to participate in the formal labor market (Thorne, 2021). However, a recent positive signal emerged in the first quarter of 2024, when the female labor force participation rate reached 15.5%, the highest level since the third quarter of 2018 (World Bank Group, 2024). Since 2021, the employment rate among refugees in camps has also decreased. Household responsibilities are preventing many women from finding employment. And, the refugees living in camps who do find jobs are much more

vulnerable to workplace hazards and abuses. The reduction in employment opportunities has contributed to rising poverty levels in Jordanian refugee camps (Figure 2).

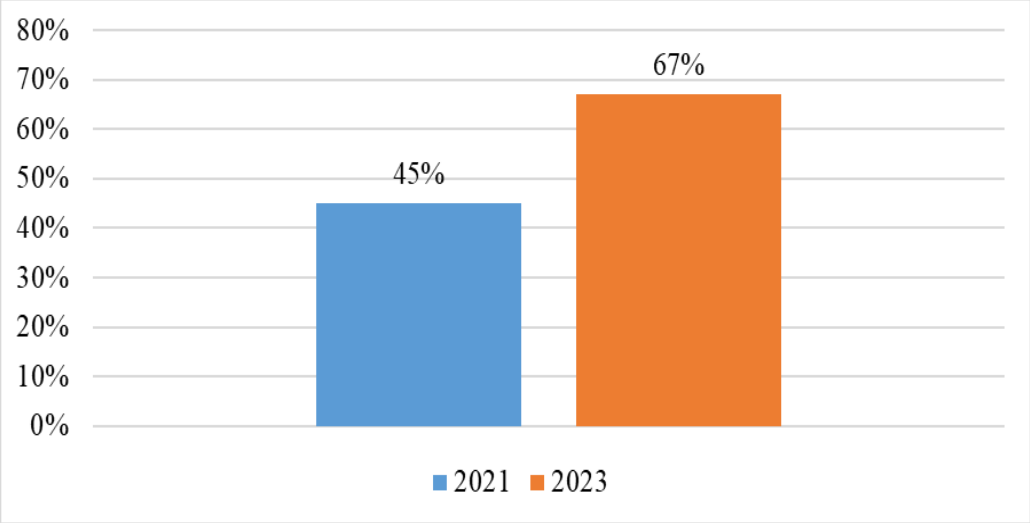


Figure 2: Percentage of poor in refugee camps in 2021 and 2023 (Anera, 2024)

Analyzing figure 2, we found an increase in the poverty level of refugees living in Jordanian camps by 22 per cent, which is a serious concern, as it may cause an increase in the criminal background and the emergence of social unrest. Although the number of Syrian refugees may tend to decrease due to the end of the civil war in Syria, as a result of the overthrow of the Bashar Assad government, to reduce the poverty level of refugees, it is necessary to provide them with effective tools for earning money, one of which may be waste collection and subsequent recycling.

### *Waste management as a driver of sustainable growth*

Gender parity and the recognition of the impoverished and marginalized as proactive agents of change towards more sustainable growth are prerequisites for green growth (European Commission, 2024). With almost 40 million workers worldwide, the trash industry contributes significantly to social development, poverty alleviation, and livelihood ((Antonis and Costas, 2015). Research suggests that around 15 million people, or 1% of the urban population in developing nations, make their living by picking up waste (Taher, Abu Safe and Perrin 2021).

Jordanians who want to become waste pickers, if given the right job opportunities, can turn their profession into a means of poverty reduction by collecting recyclable and recyclable waste as raw materials for the production of new products, thereby reducing the need for imported secondary raw materials, which will allow to save on materials for production and provide the inhabitants of the Kingdom with affordable and simple work (Wilson, Velis and Cheeseman, 2006).

In developing nations, waste picking gives many impoverished people a means of subsistence, but it also contributes to a high degree of informality in all facets of the waste system and instability due to shifting market values for recovered commodities.

Further impediments to achieving economies of scale include restricted transportation options and storage capacity for collected garbage. Informal waste pickers have the potential to decrease the time and resources that the government needs to allocate towards the collection, transportation, and handling of solid waste (SW). They can also prolong the lifespan of SW management facilities and prevent recyclable materials from ending up in landfills (European Commission, 2024).

Municipalities play a key role in leveraging community-driven waste management, they are obligated to consult communities and spread awareness. Unfortunately, all municipalities in Jordan suffer from low reimbursement, where at best it reaches 50% (Abu-Qdais, Shatnawi and Al-Shahrabi, 2023). The Jordanian government can introduce new waste management schemes based on the gender roles of women and men in Jordan. The main areas of activity within these strategies will be the purchase and sale of household waste, the reuse and recycling of solid waste, as well as the maintenance of cleanliness on the streets (Kasimba, Choguya and Muqayi, 2023). International food retailers also play an important role in ensuring social development and poverty reduction in Jordan, as they help achieve food security by implementing sustainable supply chains that include waste recycling (Zighan *et al.,* 2024).

The shift toward a more formal and transparent system for waste collection, processing, and material recovery offers the Jordanian government and businesses socio-economic opportunities. This transition can help maintain landfill infrastructure, provide livelihoods for many poor and marginalized workers, and create decent, well-paying jobs for all residents. The work of extracting material from the waste stream improves the processes of cyclical resources, at the same time, increasing social sustainability. Only government support for occupational health and safety in the waste disposal sector, the ability of its structures to involve Jordanian local communities in investment and political decision-making, as well as the opportunity to organize waste and material disposal markets can also cultivate successful private sector enterprises, and throughout the world, including Jordan, contribute to the main goal of the waste disposal sector – achieving inclusive green growth (European Commission, 2024).

The solid waste management initiatives undertaken by municipalities, MOLA, and MoEnv are the primary focus of the waste management industry in the Kingdom of Jordan, which is overseen by multiple public bodies. Priorities for promoting sustainable management of municipal solid waste, construction and demolition (C&D) waste, electrical and electronic waste (e-waste), and other waste streams are included in the action plan. Other important types of waste, such as wastewater (addressed in the water sector action plan), manure and compost (addressed in the agriculture sector action plan), as well as various measures related to the efficient use of resources (in the hospitality sector in the Plan actions in the tourism sector), are in other sectoral action plans (European Commission, 2024). Jordan can achieve its fourth national green growth goal through responsible production and consumption, improving resource efficiency. Resource efficiency can be achieved by two elements: producing the same economic output with lower environmental inputs and lower levels of pollution, and reducing the levels of pollution associated with or embedded in consumption.

Sustainable consumption and production means producing more goods of better quality with lower production costs. It is also about separating permanent economic growth and environmental degradation, increasing the efficiency of natural resource use and promoting sustainable lifestyles. Resource-efficient and clean production is a practical example of breaking the link between permanent economic growth and environmental degradation and, thus, contributes to the transition to zero emissions (Assayed *et al.*, 2023).

Sustainable consumption and production can also become key factors in poverty reduction and the transition to a low-carbon and green economy (UNESCAP, 2016). Achieving responsible consumption and production may require the cooperation of producers, the government, retailers and an active part of society.

## Conclusion

Social development and poverty reduction are the main goals of Jordan's long-term development plan. This goal is an important element of inclusive green growth. To achieve these goals, the Jordanian government must focus on reducing poverty by reducing inequality in society, such as women's empowerment and gender equality, which are critical factors in the economic growth of any modern state. Thus, the process of collecting and recycling waste can be a driver for poverty reduction and many innovations, as recyclable waste can be used as a resource for product manufacturers and reduce their need for imported secondary raw materials. The Jordanian government is recommended to coordinate consumption and production waste reduction processes by providing reliable infrastructure and working with the private sector to develop regulations that can prevent the use of harmful materials in production processes. Such cooperation should be of a permanent and contractual nature, which will allow business representatives to participate in Jordan's development processes as equal partners of the government, whose opinions will be taken into account when making important decisions. In addition, public awareness campaigns about the importance of recycling and sustainable practices can play a significant role in changing consumer behavior. Educating the public about the environmental and economic benefits of recycling can lead to greater community involvement and support for government initiatives. Schools, media, and community organizations can be powerful allies in spreading this message and encouraging a culture of sustainability. By integrating these efforts, Jordan can make significant strides toward its goals of social development and poverty reduction, while also protecting the environment for future generations.

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## Authors' Declarations and Essential Ethical Compliances

*Author's Contributions (in accordance with ICMJE criteria for authorship)*

This article is 100% contributed by the sole author. She conceived and designed the research or analysis, collected the data, contributed to data analysis & interpretation, wrote the article, performed critical revision of the article/paper, edited the article, and supervised and administered the field work.

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*Research involving human bodies or organs or tissues (Helsinki Declaration)*
The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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The author(s) solemnly declare(s) that this research has not involved any animal subject (body or organs) for experimentation. The research was not based on laboratory experiment involving any kind animal. The contexts of animals were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of ARRIVE does not apply in cases of this study or written work.

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*(Optional) PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)*
The author(s) has/have NOT complied with PRISMA standards. It is not relevant in case of this study or written work.

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